

## Important → Concentration terms formula:

1.  $\text{mass/mass \%} = \frac{\text{mass of solute}}{\text{mass of solution}} \times 100$

Here mass of solution = mass of solute + mass of solvent

2.  $\text{volume/volume \%} = \frac{\text{volume of solute}}{\text{volume of solution}} \times 100$

Here volume of solution = volume of solute + volume of solvent

3.  $\text{mass/volume \%} = \frac{\text{mass of solute}}{\text{volume of solution}} \times 100$

Here generally volume of solution = vol. of solvent

4.  $\text{moles (n)} = \frac{\text{mass of solute/solvent/substance}}{\text{molecular mass}} = \frac{m}{M}$

or  
 $\text{moles (n)} = \frac{\text{no. of particles (atoms/ions/molecules)}}{\text{Avogadro's No.}} = \frac{N_0}{N_A}$

(Here Avogadro's No. =  $6.022 \times 10^{23}$  particles)

{ Note: 1 mole of any substance contains  $6.022 \times 10^{23}$  particles }

$\text{moles (n)} = \frac{\text{Volume of gas in L}}{22.4 \text{ Litres}}$

5.  $\text{Molarity (M)} = \frac{\text{moles of solute}}{\text{Volume of solution in L}}$

$$= \frac{W \times 1000}{M \times V \text{ in ml}}$$

$$= \frac{\text{mass of solute} \times 1000}{\text{molecular mass of solute} \times \text{Volume in ml}}$$

↓  
It is temperature dependent concentration term

Unit = mol/litre or M

for dilution:

$$M_1 V_1 = M_2 V_2$$

If two solutions are mixed then final molarity will be

$$M = \frac{M_1 V_1 + M_2 V_2}{V_1 + V_2}$$

6. Normality (N) =  $\frac{\text{gram equivalent of solute}}{\text{volume of solution in litre}}$  =  $\frac{W \times V.F \times 1000}{m.m \times V \text{ in ml.}}$

or

=  $\frac{\text{mass of solute} \times \text{valency factor}}{\text{molecular mass of solute} \times \text{Vol. of soln in (ml)}}$

Normality (N) = Molarity (M) × Valency factor (V.F)

Unit: N

for dilution

$$N_1 V_1 = N_2 V_2$$

If two solutions are mixed then final Normality will be

$$N = \frac{N_1 V_1 + N_2 V_2}{V_1 + V_2}$$

7. Formality (F) =  $\frac{\text{mass of solute} \times 1000}{\text{formula mass of solute} \times \text{Volume in ml}}$

8. Molality (m) =  $\frac{\text{no. of moles of solute}}{\text{mass of solvent in Kg}}$  =  $\frac{W \times 1000}{M \times \text{mass of solvent in g.}}$

It is temperature independent

Unit: mole/Kg or m

=  $\frac{\text{mass of solute} \times 1000}{\text{Molecular mass of solute} \times \text{mass of solvent in grams.}}$

9. Mole fraction

(x) ↓ unitless

$$x_A + x_B = 1$$

Solution → Solute (A) + Solvent (B)

$x_A = \frac{n_A}{n_A + n_B}$

mole fraction of solute

$x_B = \frac{n_B}{n_A + n_B}$

mole fraction of solvent